

B. PATENTABILITY OF THE CLAIMS

Claims 1-17 stand rejected as being unpatentable over Aoki et al in view of Ogawa et al. All prior art rejections are respectfully traversed for at least the following reasons.

The present invention is directed to solving a problem in display quality which arises from a non-symmetrical feature of prior art liquid crystal displays. The non-symmetrical feature is that typically one row of pixel electrodes is bordered by only one scanning line, while other rows of pixel electrodes are bordered by (e.g. are between) two scanning lines. The lack of symmetry produces unequal parasitic capacitances, which can lead to defects (e.g. bright line defects).

In other words, in general, in a pixel which is connected to one of the scanning lines located at the outermost position on the scanning start side or scanning end side, only one scanning line that is the scanning line to which the pixel is connected is present by the pixel. However, in pixels connected to scanning lines located on or after the second row, two scanning lines, i.e., the scanning line to which the pixel is connected to and the scanning line on the previous stage or row, are present by each of these pixels.

In this non-symmetrical prior art structure, there is a difference between the total number of lines surrounding a pixel connected to one of the scanning lines located at the outermost position on the scanning start side or scanning end side and the total number of lines surrounding a pixel connected to a scanning line located on or after the second row. This means that there is a variation in the parasitic capacitance produced between a pixel electrode forming a pixel and each scanning line.

If the parasitic capacitance varies depending on each pixel, the data retentitivitiy of liquid crystal gradually degrades with time, and the degradation appears as a bright line or black line. As a result the display quality is lowered.

The present invention prevents degradation of the display quality by forming an equal parasitic capacitance in every pixel of an active matrix liquid crystal display device. In the present invention, a dummy scanning line is formed outside of the outermost scanning line on the scanning start side or scanning end side so that two scanning lines are present by a pixel connected to the outermost scanning line.

By providing the dummy scanning line outside of the outermost scanning line, the pixel connected to the outermost scanning line is sandwiched between the two scanning lines. Therefore, this pixel has the same parasitic capacitance as that produced in the pixels connected to the scanning lines on and after the second row. It is thus possible to prevent a bright line due to the difference in the parasitic capacitance between pixels, thereby improving the image quality.

Turning to the prior art rejection as articulated in the Office Action, the Examiner properly admits that Aoki et al does not teach or support a dummy scanning line. The Examiner resorts to alleging that Ogawa et al discloses a dummy scanning line formed outside of one of the scanning lines. In particular the Examiner interprets 13 in Fig. 1 of Ogawa et al as an alleged dummy scanning line. However, Ogawa's line 13 is a short circuiting wire (i.e. short ring). Ogawa's short ring 13 is provided on the periphery of the substrate preventing static electricity produced during the manufacture of a liquid crystal display device from affecting a switching element formed on the substrate. By providing the short ring 13, the static electricity escapes.

Hence, the technique disclosed by Ogawa et al is completely different from that of the present invention. Therefore, even if the technique of Ogawa were used in the structure of Aoki, the claimed invention would not be realized. The alleged combination would not prevent a lowering of the display quality due to a bright line, etc. by arranging the parasitic capacitance produced between the pixel electrode forming a pixel and the lines surrounding the pixel to be uniform in every pixel.

Thus, the structure of the present invention differs from those of the cited references. To clarify the distinction, independent claims 1 and 11 have been amended to emphasize that a parasitic capacitance is formed between the claimed dummy scanning line and the pixel electrode by provision of the dummy scanning line. In view of the clarification, the Examiner has further basis for allowance of all claims.

The failure of Ogawa to recognize (much less, address) solve the parasitic capacitance problem is evident from the fact that Ogawa's line 13 is not at the same pitch as Ogawa's scanning lines. In this regard, note applicants' dependent claim 2.

Moreover, applicants note that the rejection has not addressed numerous other patentable features of the dependent claims. For example, not addressed in the rejection nor taught/suggested in the applied references are applicants' various techniques for driving (e.g. supplying a signal) to novel dummy scanning line 30. Such techniques include generating a unique scanning signal (claims 7 and 14) or using the common signal (claims 9 and 16) for driving the dummy scanning line. Other claims concern a particular signal level applied to the dummy scanning line (e.g. claims 10 and 17), or timing of

application of a signal to dummy scanning line (claims 5, 6, 12 and 13). Nor do the applied references address the pixel overlap e.g., of the dummy canning line (claim 3).

C. INFORMATION DISCLOSURE STATEMENT

It appears that the Examiner may have overlook citing officially (Japanese Publication of Unexamined Patent Application No. 197722/1989) cited in the Information Disclosure Statement filed on July 9, 1997. Attached is another PTO-1449 which lists the '722 application. The Examiner is respectfully requested to initial, date, and return the attached PTO-1449 to evidence official consideration.

D. MISCELLANEOUS

In view of the foregoing and other considerations, all claims are deemed in condition for allowance. A formal indication of allowability is earnestly solicited.

Any additional claims fees necessitated by this Amendment are indicated on the attached transmittal letter and are paid by an accompanying check. A Request for Extension of Time and accompanying check is also simultaneously filed herewith. Should the transmittal letter, request for extension of time, not be found, the Commissioner is authorized to charge the undersigned's deposit account #14-1140 in whatever amount is necessary for entry of these papers and the continued pendency of the captioned application.

TANAKA et al
Serial No. 08/835,207

Atty Dkt: 1035-128
Art Unit: 2775

Should the Examiner feel that an interview with the undersigned would facilitate allowance of this application, the Examiner is encouraged to contact the undersigned.

Respectfully submitted,
NIXON & VANDERHYE P.C.

July 13, 1998

By: H. Warren Burnam, Jr.
H. Warren Burnam, Jr.
Reg. No. 29,366

HWB:lsh
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100